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Impact of exposure to alcohol marketing and subsequent drinking patterns among youth and young adults (Protocol)

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TABLE OF CONTENTS

[Intervention Protocol]

Impact of exposure to alcohol marketing and subsequent drinking patterns among youth and young adults

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ABSTRACT

This is a protocol for a Cochrane Review (Intervention). The objectives are as follows:

To assess the impact of exposure to any form of alcohol marketing, compared to less exposure or no exposure, on alcohol consumption patterns among youth and young adults up to and including the age of 25 years (we want to be able to look at potential dose response relationships at different levels of exposure).

BACKGROUND

Description of the condition

Alcohol and health

Globally, alcohol use is the seventh-leading risk factor for poor health in all ages (GBD 2016 Risk Factors Collaborators 2017). As of 2016, alcohol is the leading risk factor in disability-adjusted life-years for people between the ages of 15 and 49 years (GBD 2016 Risk Factors Collaborators 2017), and it is associated with over 200 health conditions and injuries, as defined by the International Classification of Diseases (Rehm 2010). Alcohol use is causally associated with cancer of the oral cavity, pharynx, larynx, oesophagus, liver, colon, rectum, and female breast (IARC 2012). Of all cancer deaths in 2010, 4.2% were attributable to alcohol (Rehm 2013). Heavy drinkers are four times more likely than non-drinkers to develop pancreatitis (Irving 2009), and five-to-six times more likely to develop liver cirrhosis (Rehm 2010a). Heavy alcohol consumption is associated with increased risk of injury, and repeated occasions of alcohol consumption with in-

creased risk of injury over the lifetime (Rehm 2010b). In 2000, alcohol use was a causal factor in 16.2% of injury-related deaths worldwide, including both intentional injuries, such as violence and suicide, as well as unintentional injuries, such as motor vehicle crashes (Cherpitel 2013). Alcohol is also responsible for 22% of deaths due to self-harm (WHO 2014).

Epidemiologic studies have linked modest alcohol consumption with decreased risk of cardiovascular disease (Corrao 2000; Marmot 1981; Rimm 1999); however, recent studies have contested the idea that modest consumption of alcohol has been associated with reduced risk of disease (de Gaetano 2016). These reviews pointed out one weakness in earlier studies that muddy the waters on the comparison between alcohol abstainers and occasional drinkers. Abstainer bias occurs if former drinkers (some of whom quit because of health consequences) are included in the nondrinker group, making abstainers appear at higher risk compared to occasional drinkers. The recent reviews found that studies that removed alcohol quitters from the abstainers group found no advantage to modest alcohol consumption with respect to cardiovascular disease outcomes (Stockwell 2016; Zhao 2017). Finally, a Mendelian randomisation study used a gene associated with lower levels of alcohol use and found the presence of that gene was associated with lower risk of coronary disease, regardless of level of alcohol consumption (Holmes 2014). In all, there is much evidence now to suggest that drinking at any level increases risk for cardiovascular disease.

Among young people, alcohol use is associated with poor school performance (Balsa 2011), increased risk of injury, unplanned and unprotected sex (Hutton 2008), and a greater likelihood of developing alcohol use disorders later in life (DeWit 2000). Young people who begin drinking before age 15 are five times more likely to develop an alcohol use disorder compared with those who delay drinking (Grant 1997). Adolescents who binge drink are also significantly more likely to engage in criminal activity and less likely to complete high school and be involved in clubs or activities as compared to non-bingers (Hill 2000). Moreover, alcohol use in adolescence may have acute and prolonged neurobiological effects (Clark 2008; Squeglia 2009). Among 15- to 19-year-olds, and 20- to 24-year-olds, alcohol use was the leading risk factor for death (Mokdad 2016).

The economic burden of alcohol use includes costs related to health care, law enforcement and justice, property damage, and social work, along with indirect costs, such as loss of productivity and unemployment (Anderson 2006). According to the most recent data available, annual alcohol attributable costs reached USD 249 billion in the USA in 2010 (Sacks 2015), EUR 155.8 billion in the European Union (USD 207.4 billion) in 2010 (Rehm 2012), and AUS 15.3 billion in Australia (USD 12 billion) in 2005 (Collins 2008). Other costs attributable to alcohol use that are born by those other than the drinker are more difficult to measure. Harms from interpersonal violence, psychological distress, pain and/or suffering from domestic violence, marital separation and divorce, child and/or household neglect, poverty and abuse, all exacerbated by alcohol use, have been termed "intangible", and contribute to reduced quality of life and suffering, both for the drinker and those around the drinker (Anderson 2009; Navarro 2011; Thavorncharoensap 2009).

Harmful alcohol use is a public health issue. The global burden of alcohol-related disease and the social and economic costs borne by society attributed to alcohol use are far-reaching and complex. As such, it is important to address the modifiable risk factors that encourage risky patterns of use. Among youth and early-stage drinkers, environmental risk factors in particular (versus internal risk factors) tend to predominate (Agrawal 2008; Fowler 2007; Pagan 2006; Stoolmiller 2012; Wilsnack 1991).

One of these modifiable risk factors is alcohol marketing. Transnational corporations that control the sale and distribution of alcohol have been implicated in the industrial epidemic, a movement describing corporations' strategic campaigns that threaten the effectiveness of public health interventions (Moodie 2013).

Alcohol marketing

Alcohol is a consumable product. As such, alcohol products are produced by locally owned companies, along with national and multinational corporations that sell known alcohol brands worldwide. Consumption of globally marketed brands is driven, in part, by sophisticated marketing campaigns that involve integrated messaging across platforms and countries. As pointed out by Petticrew and colleagues (Petticrew 2017), alcohol marketing effects are complex and need to be viewed from a systems perspective, not limited only to one kind of study or a single set of outcomes. The authors point out that these "systems" level considerations go well beyond what could be covered in any one Cochrane Review (Siegfried 2014). A full set of studies and outcomes would include content analyses (to ascertain the plausibility of effects on behaviour), econometric studies of aggregate consumption, individual-level cross-sectional and longitudinal studies, mediational analyses aimed at mechanisms, experimental studies of attention, brain cue-response, attitudinal response, and behaviour, and natural experiments to understand the effect of advertising restrictions or bans. Finally, the influence of alcohol marketing could interact with other variables that affect alcohol consumption within the environment. Individuals may be exposed to alcohol warning messages which can increase their awareness of alcohol harm and protective behaviours (Kaskutas 1992). The policy environment such as the alcohol control system, price policy and physical availability all may have a significant impact on drinking behaviours from a systems perspective (Burton 2017).

In the present review, we start by defining alcohol marketing very broadly and accepting that alcohol marketing effects may be viewed from a number of levels or perspectives though the social-ecological model (McLeroy 1988). We then address a more narrow topic of public health significance: to summarise the results

of longitudinal individual-level studies and experimental studies of behaviour regarding drinking among youth, and we employ a comprehensive search strategy that can be replicated and updated. Alcohol marketing aims to use favourable perceptions about alcohol and persuasive techniques to affect alcohol purchase decisions (Austin 2006). The alcohol industry spends about USD 1 trillion annually worldwide to market their products (IAS 2013). These campaigns use image advertising to link alcohol with youth, fun, enhanced sexuality, and other themes that appeal to young adults (Berey 2017; Chen 2005; Morgenstern 2017; Siegel 2016; Smith 2014). The stated intent of marketing is to influence choice of brand among legal users (Martino 2017). However, whether marketing practices promote unsafe drinking patterns among legal users is an open question. Moreover, underage alcohol users are not markedly different in age from the legal young adult target segment. Thus, image advertising designed to communicate favourable drinking associations to legal drinkers may influence underage youth as well.

Exposure to alcohol marketing

Despite self-regulatory efforts by the industry, and/or country-wide regulations, adolescents continue to be exposed to alcohol marketing through a variety of media. Youth are exposed to alcohol commercials on television and radio and in magazines (CAMY 2010a, CAMY 2010b, CAMY 2011; Tanski 2011), as well as alcohol brand placements and alcohol use portrayals on television (Murphy 2008), in movies (Bergamini 2013; Dal Cin 2008b), in music lyrics and in music videos (Koordeman 2012; Primack 2012). In recent years, alcohol marketers have shifted their focus online (Chester 2010; Nicholls 2012), and today many adolescents are exposed to alcohol images through social networking sites and other digital platforms (D'Amico 2017; Jernigan 2014; McClure 2016; Winpenny 2013).

Alcohol-branded merchandise or alcohol promotional items represent another way that alcohol companies increase brand exposure among young people (Jones 2016; McClure 2006). Youth and young adults are further exposed to alcohol marketing through sponsorship of sports teams and events (Macniven 2015). Authors of a systematic review found positive associations between exposure to alcohol sports sponsorship and increased levels of consumption, including two studies reporting significant associations between exposure to sports sponsorship and increased levels of consumption among children (Brown 2016). Alcohol sponsorship of music festivals is another potential medium of exposure for young people and has the potential to increase level of brand recall, brand awareness and attitude towards the brand (Rowley 2008). Adolescents are therefore commonly subjected to positive portrayals of alcohol in general, as well as for specific brands.

Longitudinal studies of marketing exposure and drinking outcomes

The majority of research examining the association between exposure to alcohol marketing and youth drinking has been survey work, either cross-sectional or longitudinal in nature. Given the limitations in establishing directionality or causality from cross-sectional studies, the focus of other (and our own) reviews has been on longitudinal research studies. Since 2009, four systematic reviews have summarised longitudinal studies on the association between exposure to alcohol marketing and youth alcohol use. The reviews, published between 2009 and 2017, collectively included 64 studies from 1994 to 2016, with participants ranging in age from nine to 29 years-old at baseline, and up to 29 years-old at follow-up (Anderson 2009a; Jernigan 2017; Scott 2017; Smith 2009). Table 1 presents key findings from the four reviews, presenting each of the studies in each review for comparison. Two of the four reviews investigated exposure to traditional, industry-driven marketing only (e.g. television commercials, magazine advertisements for alcoholic beverages; Jernigan 2017; Scott 2017), whereas two reviews also included influence of exposure to alcohol portrayals in the media (e.g. alcohol consumption by characters; Anderson 2009a; Smith 2009). Across all reviews, patterns of alcohol consumption were the primary outcomes, with one review also addressing advertising receptivity and attitudes to alcohol advertising or brand awareness (Anderson 2009a).

Each review concluded there was a positive association between alcohol marketing and youth drinking. Identified limitations of the reviews included heterogeneity in exposure measures, publication bias, and inclusion of studies published only in English, as well as failure to systematically characterise unmeasured confounders and high levels of attrition in some of the studies included in the review (Anderson 2009a; Jernigan 2017; Scott 2017; Smith 2009). There are limitations with the reviews as well, including varying definitions of alcohol marketing, and that the search strategies employed were not always comprehensive. For example, only one of the reviews included a number of studies that reported null results and negative associations (Scott 2017). Finally, none of these reviews is published in a format or venue that would facilitate regular updating of the review as more scientific evidence accumulates.

Experimental studies of marketing exposure and drinking outcomes

Another means of assessing the influence of exposure to alcohol marketing on subsequent drinking is through an analysis of experimental studies. Experimental studies have the advantage that exposure can be randomly assigned; this decreases the likelihood of unmeasured confounding. These experimental studies also allow researchers to precisely control alcohol marketing exposure and measure drinking outcomes, both cited as limitations in longitudinal studies reliant on self-reported data that may be unreliable (Brener 2003; Stockwell 2016). Existing laboratory-based studies have investigated the immediate effects of exposure to alcohol marketing on drinking behaviour. A shortcoming of experimental

studies is that they lack ecological validity; results from these studies on their own are difficult to generalise (Brewer 2000). However, this line of research allows for a complementary investigation into the association between alcohol marketing and subsequent drinking, adding to the knowledge gained via longitudinal and other types of studies.

We identified one systematic review and meta-analysis of experimental studies looking at the immediate effects of alcohol marketing, including depictions of alcohol use, on drinking outcomes and alcohol-related cognitions (Stautz 2016). A total of 24 studies was included in the review, including participants ranging in age from 16 to 45 years (mean ages ranging from 21 to 25.25 years), who were all students (16 was the legal drinking age in the Netherlands at the time the relevant study was conducted). The authors completed five meta-analyses. Table 2 presents key findings from each of the studies included in the review.

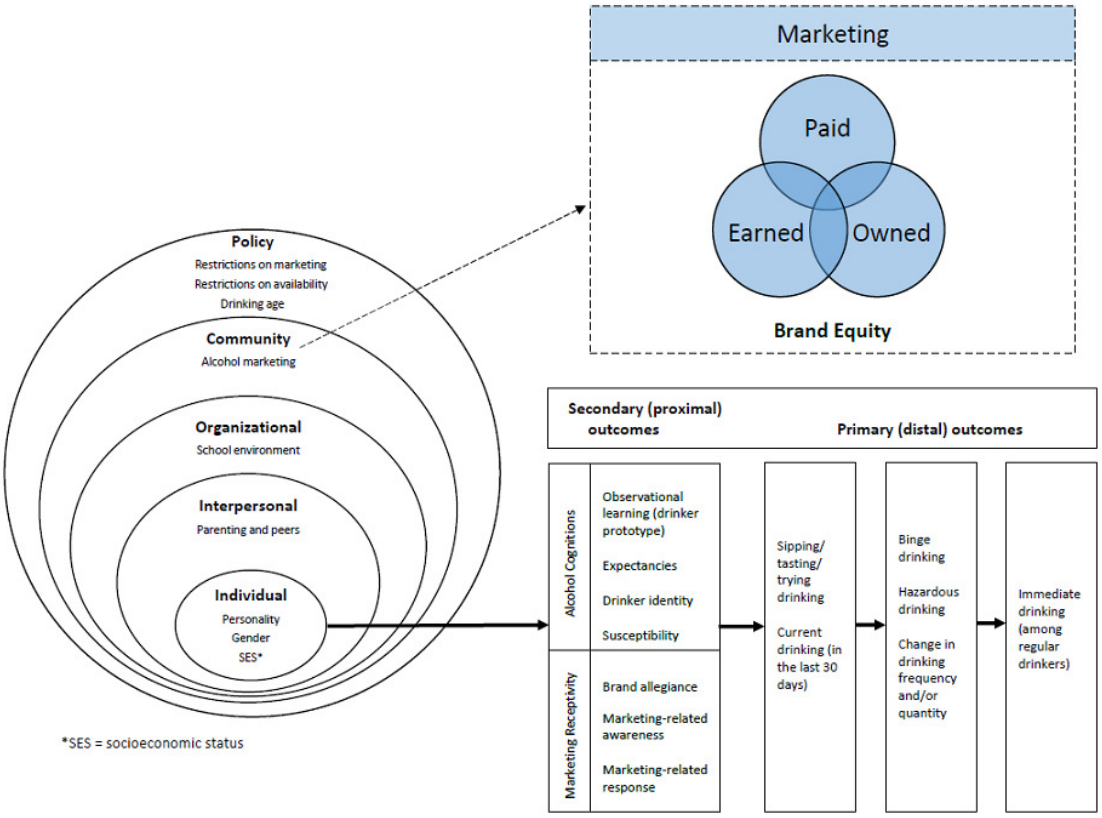
Authors of the review concluded that exposure to alcohol advertising, but not portrayals of alcohol use on television or in movies, influenced immediate drinking. They also found a positive association between exposure to alcohol portrayals, but not alcohol advertising, and explicit alcohol-related cognitions, e.g. attitudes, outcome expectancies or intentions to consume alcohol. Identified limitations of the systematic review included the small number of published experimental studies of the influence of alcohol marketing on drinking behaviours and alcohol-related cognitions. The type of marketing used in these studies was also a noted limitation, as the marketing exposures were exclusively alcohol advertising or portrayals of alcohol use in visual broadcast media (television, movies). As well, participants in all studies were students. A further limitation of the review was the smaller than optimal sample sizes for four out of the five meta-analyses, which reduced the quality of evidence. As with the reviews of longitudinal observational studies, this review was not published in a format or venue that would facilitate regular updating as more scientific evidence accumulates.

Description of the intervention

Marketing includes a wide range of activities used to convey information about a product to an intended audience. This information often includes details on what differentiates this particular product from competing items (Ryoo 2017). The intent of marketing is to increase demand by prompting the purchase of the product being advertised and to cultivate brand allegiance. This is accomplished by building brand equity, attributing meaning and emotion to the brand through imagery that associates the brand with lifestyles appealing to the target population (Casswell 2004; Keller 2008; Kotler 2016).

We define alcohol marketing broadly as the 'paid, earned, and owned media' that are often used simultaneously to increase brand equity (described below and in Figure 1). The categories are overlapping and are not mutually exclusive. We use this definition of marketing, as it is broad and encompasses marketing strategies identified in past and more recent literature.

Figure 1. Conceptual Model: Alcohol marketing and youth drinking



Paid media

'Paid media' is defined as any type of marketing that is paid for by the company that owns the product. Paid media includes traditional image advertising, for example, television and print media advertisements that anyone who watches television or reads a magazine is familiar with. Alcohol imagery is also common in retail outlets through store displays. Aware of the trend away from traditional to streamed media, companies increasingly seek to place their brands in the entertainment itself, and alcohol imagery, brand appearances and mentions can be found in movies, television entertainment, and in music videos or song lyrics.

Alcohol companies seek celebrity endorsements of brands by sports figures, actors, and musicians in order to associate the brand with the characteristics of the celebrity. In most of these instances, celebrities are paid by the brand or are given shares in the company for the use and promotion of their products (Ciccone 2011; KapitallWire 2012; Kiefer 2009). Celebrity endorsements may also overlap with the 'earned media' category and we will discuss that capacity in a later section.

Promotional activities are also examples of paid media. These activities include promotional discounts, discounts at point-of-sale, cross-promotions with other products (e.g. alcohol and food purchase), coupons, or giveaways.

Sponsorship is another type of paid media that works to connect the product or brand with an event. Event sponsorship positions a product or brand for a certain customer segment so that there is a match between the product or brand, and the demographics and psychographics of the event attendees. Sponsorship of sports teams and sporting events is one example (Macniven 2015). O'Brien and Carr conducted a frequency analysis of all verbal and visual references to alcohol on the televised Formula 1 Monaco Grand Prix 2014 (O'Brien 2015), demonstrating on average, 11 promotional references to alcohol per minute during the race.

Companies are increasingly focused on social media because it is cost-effective, is often seen as more credible than more traditional platforms, allows for greater levels of interactivity with customers, is quite flexible in its messaging and allows for greater reach into the younger segment (Dehghani 2015; Lee 2011). 'Paid online media' includes pay-per click advertising, display advertisements on websites, advertisements that appear on social media, and brand

ambassadors, or paid influencers, who engage with a specific brand on any variety of online platforms. This engagement may be in the form of photos of the individual drinking an alcoholic beverage with the label clearly in view, a tweet about a certain brand, or an Instagram post with a brand mention or photo.

The final form of paid media is character portrayals of on-screen drinking in entertainment media (television, movies, music videos, etc.). As a rationale for including these portrayals, we look to the tobacco control movement for analogous evidence. Cigarette companies claimed in the early 1990s that they had ended payments for movie placements (Colford 1990; Tobcaco Institute 1990). However, tobacco company documents showed that the tobacco industry hid the extent of product placement deals from the Federal Trade Commission (Mekemson 2002). Cigarette brand product placement was common in top box office hits through the 1990s but dropped exponentially one year following the implementation of an agreement between cigarette companies and State Attorneys General as part of the Master Settlement Agreement in 1998, restricting tobacco product placements in movies (Bergamini 2013). The drop in brands also heralded a large drop in on-screen smoking (Morgenstern 2017), suggesting that a large share of the on-screen smoking was a result of the product placement deals. From this circumstantial evidence, it seems likely that the tobacco industry had a hand in not only the advertising (paid placements) but also the minutes of tobacco use portrayed on screen, despite the voluntary restriction on the practice.

For alcohol, we know that alcohol brands appear in half of the top 100 box office hits each year and that the most highly advertised brands are the ones that typically appear in movies (Dal Cin 2008a, Dal Cin 2008b). We think it unlikely that the movie industry - which requires payments for brand placement - would extend brand appearances to the alcohol industry without monetary or in-kind contributions. Alcohol brands are also common in the lyrics and music videos of songs popular among youth, often produced by artists who are paid 'ambassadors' or 'spokespersons' for particular companies (Cranwell 2015). Therefore, we ascribe an advertising motive to entertainment product placement, product appearance, and on-screen drinking, and include these studies in our review.

Owned media

The 'owned media' category includes content that is wholly owned and created by the company, and it allows brands to use central media functions to provide some form of service or entertainment to a target group. Examples include a brand's social media channels (e.g. Facebook page, Twitter feed, Instagram account) and the brand's own blog posts and website, the latter of which is often used for product sales in addition to promotion. Through owned media, companies have complete control over the portrayal of their product and can facilitate engagement with and among consumers (Baetzgen 2013). Because of the two-way nature of social media, some content on social media channels may overlap with the 'earned media' category, as discussed below.

Earned media

'Earned' media is marketing that results from customer engagement. This type of media content is created by people other than those who work for the brand, and published on channels not owned by the brand. Examples include press coverage, mentions on social media, shares, re-tweets including the brand, product reviews, and blog posts by people who are not connected to the brand. The overlap with the 'owned' category may occur here, where individuals may post, re-tweet or share their own reviews, photos, or experiences with the brand, on the brand's Facebook page, for example. Although the brand's Facebook page is owned by the brand and has content created by the brand, user engagement may lead to individuals posting to that page, as an example of 'earned' media. This type of user-generated advertising is a digital media phenomenon, in which companies encourage members of the public to post images of themselves with the branded product (e.g. a Facebook user is in a photo holding a branded alcoholic beverage and posts it to the alcohol brand's Facebook page), or a textual endorsement of the product (e.g. a Twitter user tweets about a certain brand of alcohol). This user-generated content is often earned by way of a brand-sponsored contest or a trending hashtag.

Product or brand appearances in movies, on television, in streamed media, in music videos or song lyrics may fall under the 'paid' or 'earned' categories and may overlap. Script writers, actors, or song writers may themselves want to be shown drinking a certain product and may not be paid for the endorsement. When celebrities are photographed in their personal time, drinking certain alcohol brands, and these photographs are circulated widely, these celebrity endorsements may be a case of 'earned' rather than 'paid' media, although recent media coverage has exposed many of these endorsements as sponsored content (sponcon) (Pasquini 2017, Hope 2016).

Branded merchandise distribution falls under the 'earned' media category as well. A t-shirt, bag, baseball cap or other similar type of merchandise with a brand logo attached, are created by the brand and given away as promotional items by the brand. An individual who chooses to use the item by wearing it or displaying it is expressing an affinity with the brand. In this way, the brand has earned or secured the media exposure.

'Earned media' is the direct result of companies' efforts in the 'paid' and 'owned' categories. When a brand invests heavily in paid and owned media, more people tend to become aware of the product, consume the product, and then share their experiences about the product, sometimes including celebrities who have greater influence in increasing a brand's equity, and help secure the positive associations between a brand and its consumers.

To date, no review has identified or specifically included studies of

exposure to 'earned' media, which maintains a message of alcohol marketing. It is often impossible to determine whether an activity that presents a brand has been paid for by the industry. However, movies and television programmes generally require payment for products to be included and such paid product placement is a large and growing industry (Russell 2005; Russell 2006; Weinberger 2012), estimated at a worth of approximately USD 6 billion in 2012, up 12.8% from the previous year and estimated to grow to USD 11.4 billion in 2019 (Lafayette 2015).

How the intervention might work

Researchers are beginning to understand how paid, owned, and earned marketing influences underage drinking. Figure 1 is a conceptual model based on the social-ecological model (McLeroy 1988), depicting how we hypothesise the influence of alcohol marketing on young people's drinking. At the centre of the conceptual model are individual-level differences, for example personality traits, gender, or beliefs about the effects of alcohol. The individual acts within the environment created by the interpersonal (parent and peer influences), organisational (school environment), community (media and more specifically here: the exposure to alcohol marketing), and policy (regulations on the sale, distribution and consumption of alcohol) level influences.

Alcohol marketing is a community-level exposure which reaches the individual through many avenues. Alcohol companies have a vast array of marketing strategies, based on whether the aim is to communicate favourable associations with the brand, or to prompt an immediate sale, or both. A store display can communicate a favourable association and also show a promotional discount designed to prompt a purchase. With respect to the underage drinker, the communication of favourable associations with the brand and depictions of the act of drinking are the most important components of marketing (McClure 2013). A favourable association is typically communicated through imagery, via different forms of alcohol marketing, as described above.

From a developmental perspective, young people are highly susceptible to image appeals because of their preoccupation with personal image and identity (Giles 2004; Kroger 2007). They constantly question who they are, how they look, and how they are perceived by their peers (Finkenauer 2002), as they develop a concept of self. Adolescence and young adulthood are often characterised by increased admiration of famous persons (Giles 2004). Alcohol marketing to youth focuses heavily on lifestyle elements and involves popular culture role models, elements that resonate with these young consumers (Chen 2005).

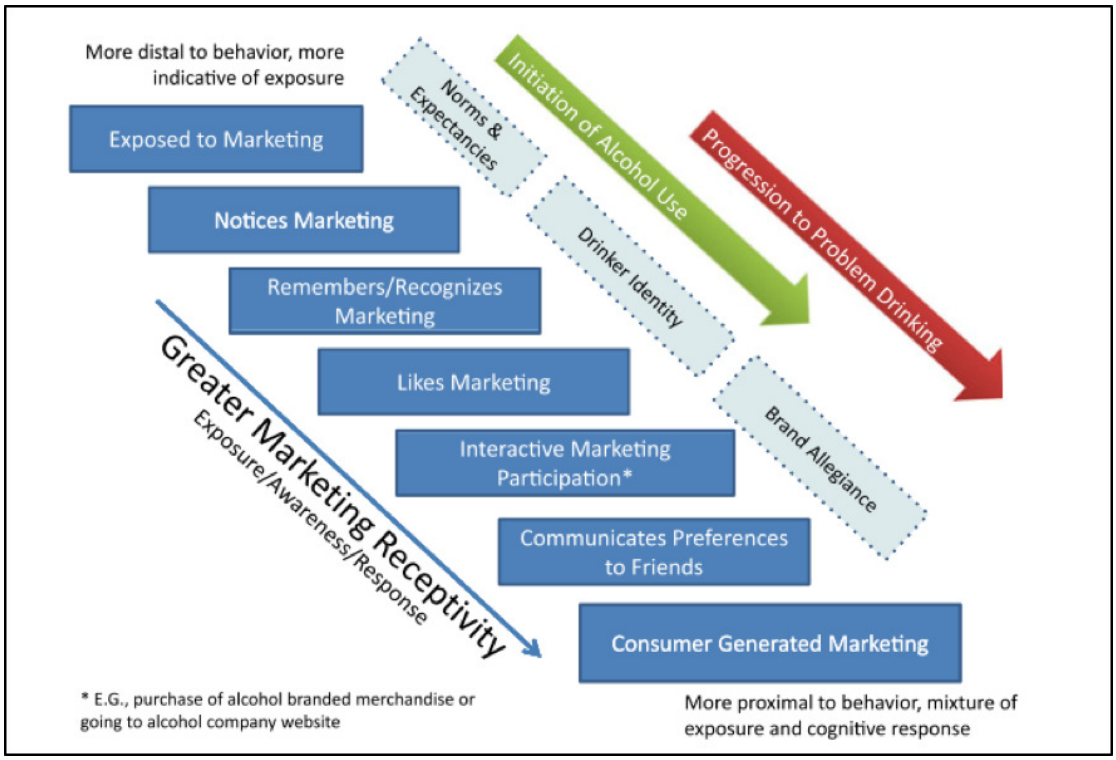
As McClure and her colleagues explain, "[a] number of theoretical models describe how marketing exposure could affect behavior. These are based largely on social cognitive theory (Bandura 1986), and message interpretation processing models (Austin 2006; Fleming 2004; McGuire 1985; Unger 2003), which suggest that the way in which individuals interpret and respond to advertising is as important as the exposure itself (Casswell 1998; Grube 1994). Austin and colleagues (2006) concluded that exposure measures were weaker predictors of progression to alcohol use than response variables, such as ad identification and liking of beer brands [Austin 2006]. Such attitudinal responsiveness to advertising is termed marketing receptivity, as operationalized by Pierce and colleagues (1998) for studies of tobacco marketing [Pierce 1998] and adapted for alcohol by Unger and colleagues (2003) and Henriksen and colleagues (2008) [Henriksen 2008; Unger 2003]. In these studies, marketing receptivity was viewed as a series of steps, each representing higher involvement with marketing. "Low receptivity" was characterised by brand recognition and recall (awareness), "moderate receptivity" by endorsing a favourite alcohol ad, and "high receptivity" by owning or wanting to own branded clothing or other merchandise. This theoretical approach suggests that young people are exposed to alcohol marketing, become aware of and receptive to that marketing, and ultimately develop an interactive relationship with the brand. Thus, there is evidence to support the idea that a pure measure of marketing exposure, while important, may be a weaker predictor of behavior than a measure of an affective or cognitive response. Thus, the difference in the way marketing is assessed could explain some of the heterogeneity of results in the alcohol marketing studies cited earlier (McClure 2013).

"Chen and colleagues (2005) demonstrated that affective response to ads related to portrayed lifestyle elements and that liking an ad was associated with ad effectiveness as defined by likelihood of buying/wanting to buy the product [Chen 2005]. In a reciprocal process, as experimental drinkers gain experience with drinking and become more interested in advertising, they may be more likely to identify themselves as being a drinker (Gerrard 1996). Similarly, adoption of a favourite brand could be influenced by exposure to alcohol marketing, as young people incorporate imagery and attributes associated with a certain brand into their own sense of self (Austin 2006; Casswell 2004; Casswell 1998). We have previously demonstrated that two-thirds of U.S. underage drinkers had a favourite brand to drink and that the preferred brands were those with highest advertising expenditures. In addition, having a favourite brand was associated with substantially higher binge drinking rates compared with youth who did not have a favourite (Tanski 2011). Among experimental drinkers, these marketing-specific cognitions could mediate the pathway between exposure or receptivity to alcohol marketing and heavy alcohol use, but this has not, to our knowledge, been tested (McClure 2013).

Social-cognitive theoretical models explaining young people's alcohol use have thus far focused on normative beliefs, prototypes, refusal self-efficacy, and alcohol expectancies (Austin 2006; Brown 1987; Dal Cin 2009; Tickle 2006). Alcohol-related cognitions have been assumed to be one of the most proximal predictors of both initiation and maintenance of alcohol use in youth. Expectancies about the pros and cons of drinking are related to drinking in adolescents (Jones 2001; Wiers 2007), and young adults (Bot 2005; Fleming 2004). Further, perceived peer norms

on drinking are related to heavy drinking and problem drinking in late adolescence and young adulthood (Borsari 2003; Bot 2007; LaBrie 2010). As these are robust, well-established predictors of drinking, it is important to examine marketing-specific cognitions in the context of these predictors. If marketing-specific [receptivity]... mediate[s] the relation between alcohol marketing and binge drinking, above and beyond established alcohol-related cognitions, this would underscore their relevance in alcohol marketing models of behavior" (McClure 2013; see Figure 2).

Figure 2. Heuristic Marketing Receptivity Model (figure used with permission: McClure 2013)



As shown in our proposed conceptual model (Figure 1), the alcohol advertising effect would be expected to begin with impacting how the underage person views the advertised brand in the context of drinking alcohol. The impact would depend on what stage the underage person is in with regard to their drinking (non-drinker, early drinker, heavy drinker). The advertising exposure happens on a frequent (perhaps even daily) basis and would be expected to shape the individual's alcohol- and alcohol marketing-related cognitions and receptivity via their impressions of drinkers (observational learning and drinker prototype), their drinker identity, their notions about what alcohol can do for them (expectancies) and, ultimately their intention or willingness to drink alcohol in a social setting (susceptibility/intentions). As individuals try alcohol repeatedly, they become more aware of alcohol advertising and the aspirational messaging. The repeated exposures shape perceptions of brand equity and allegiance (e.g. their favourite brand to drink) and levels of marketing receptivity. Drinking outcomes typically measured in longitudinal studies can range from trying drinking for the first time, current drinking (drinking in the past 30 days), binge drinking, hazardous drinking, or a reported change in the drinking frequency and/or quantity. In experimental studies, im-

mediate drinking among current drinkers is typically measured, although proximal outcomes (e.g. intention or willingness to drink) and more distal outcomes (subsequent drinking) have been measured.

Why it is important to do this review

The purpose of this review is to investigate the impact of exposure to alcohol marketing on young people's drinking by compiling results from the significant body of evidence that currently exists. At this time, there is fragmented evidence on this relationship. In the present review, we will investigate associations between alcohol marketing exposure and subsequent drinking behaviours on the basis of evidence from both longitudinal observational studies and experimental studies, and broaden the scope of the measured exposures to include all forms of marketing.

Our goal is to expand on the existing body of work documented above. We will seek to improve the review process by undertaking a systematic evaluation of existing literature, and we will carefully document heterogeneity in study characteristics. We will be more comprehensive in the studies we include in several ways. First, we will use a broader, and cleaner, definition of alcohol marketing than has been used previously. We define alcohol marketing in three categories: paid, earned and owned media. This inclusive and comprehensive definition will allow for an investigation into studies of the influence of additional types of alcohol marketing compared with the types that were previously studied, as well as newer forms of alcohol marketing that were not in existence or still emerging at the time of some of the prior reviews. Second, we will include studies in all languages, not English-only, as was done previously. Finally, we will group studies based on exposure type and attend to other sources of bias. Based on our findings, we will make recommendations on the most appropriate types of alcohol marketing exposure measures so that future studies can add to the literature in a consistent and comparable way.

Moreover, vulnerable populations, such as youth, women, and racial minorities are often targets of alcohol marketing campaigns (Bosque-Prous 2014; EUCAM 2008; Kwate 2009; Pasch 2007), contributing to the inequitable burden of harm. For example, recent evidence points to the increase in alcohol marketing and decrease in alcohol marketing regulation in low-income nations in Africa (Jernigan 2015). It is critical to highlight the differential impact of exposure to alcohol marketing among vulnerable populations.

A Cochrane Review similar to the one we are undertaking was conducted on the influence of tobacco advertising on adolescent smoking (Lovato 2011). The authors concluded that exposure to tobacco advertising increased the likelihood that young people will start smoking.

Another Cochrane Review reported on the impact of alcohol advertisement bans on alcohol consumption in adolescents and adults (Siegfried 2014). Because there have been few of these bans worldwide, this resulted in low-quality evidence, which precluded any recommendation based on that data. The narrow scope of this earlier review presented only a small fraction of the current literature. There is a need for a larger scope Cochrane Review that presents evidence from a comprehensive set of longitudinal observational studies and experimental studies on alcohol marketing exposures and subsequent drinking behaviours. In order to make recommendations on the most effective interventions to reduce alcohol-related harm, it is important to first understand the relationship between exposure and drinking behaviours. The present review will aid in the understanding of this relationship.

The inconsistent nature of the reviews to date, underlie the need for a consistent and comprehensive approach; the Cochrane guiding framework will allow for just that. Further, in concluding the Cochrane Review, we will make recommendations on the most appropriate methods of measurement and reporting of alcohol marketing exposure so that future studies can be included in meta-analyses.

OBJECTIVES

To assess the impact of exposure to any form of alcohol marketing, compared to less exposure or no exposure, on alcohol consumption patterns among youth and young adults up to and including the age of 25 years (we want to be able to look at potential dose response relationships at different levels of exposure).

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials (RCTs) are the best design for inferring causality. We will include all RCTs comparing drinking-related outcomes (both primary and secondary) between groups exposed or not exposed to alcohol marketing, although we expect to find very few of these as it is arguably unethical to randomise participants to alcohol marketing in order to evaluate potentially harmful effects. We suspect that the majority of studies we will include will be longitudinal non-RCTs, such as controlled prospective and retrospective cohort studies, interrupted time series studies, case-control studies and controlled before-and-after studies (see Appendix 1 for definitions of study designs). We will not consider studies using cross-sectional designs.

Types of participants

Children, adolescents and young adults, up to and including age 25. We will include studies that include people of all ages if separate data for young people, aged 25 or younger, are provided.

Types of interventions

Exposure to any alcohol marketing, defined as follows.
Paid media:

- Industry-driven alcohol advertising
  - Image advertising
    - Traditional media (e.g. television, movies)
    - Digital media (e.g. online)
    - Print media (e.g. magazines)
    - Store displays
  - Sponsorships
    - Sports events
    - Music events
- Alcohol promotions
  - Promotional discounts, giveaways, cross-promotion, point-of-sale

Owned media:

- Brand website
- Brand social media channels (e.g. Facebook, Twitter, Instagram)

Earned media:

- User-generated advertising
  - Photo documentation (e.g. 'selfies') in social media
  - Mentions in social media
  - Shares/re-tweets
  - Blogs/product reviews
- Branded merchandise (e.g. clothing, bags, pens with branded logos)
- Press coverage

Paid/earned overlap

- Product/brand placement or appearance in:
  - movies/television/streamed
  - music videos/song lyrics
- Character drinking (television/movies)
- Branded alcohol use by celebrities (celebrity endorsement)

There may also be overlap across and between other categories that we will investigate as we encounter examples in the included studies.

Types of outcome measures

Primary outcomes

Primary (distal) outcomes (Figure 1)

- Sipping/tasting/trying drinking: did the respondent indicate that they tried alcohol for the first time, more than just a sip?
- Current drinking (drinking in the last 30 days): current drinking typically is assessed with two questionnaire items, one querying the number of standard drinks (where 'standard drink' is defined as one 12-ounce can or bottle of beer, one 5-ounce glass of wine, a 1.5-ounce shot of liquor, alone or in a mixed drink) typically consumed within a single drinking episode in the last 30 days (i.e. drinking quantity), and another querying the number of drinking episodes experienced during the past 30 days (i.e. drinking frequency). Current drinking is then defined as the product of drinking quantity x drinking frequency, typically scored in terms of number of drinks per week.
- Binge drinking frequency: binge drinking frequency is measured as the number of drinking episodes in which the respondent consumed four or more (for women/girls) or five or more (for men/boys) standard drinks within a two-hour period.
- Hazardous drinking: hazardous drinking can be measured in a number of ways, but most often is defined as 21 drinks or more per week for men, 14 or more drinks per week for women, or consumption of 10 or more drinks on a given day for either men or women.
- Frequency or quantity, or both: change is measured in terms of the difference from baseline to the current assessment in typical drinking quantity (number of drinks per occasion) or frequency (number of drinking occasions), or both, within a given time period; the past 30 days is commonly used.
- Immediate drinking (among regular drinkers): immediate drinking within experimental studies is measured in terms of millilitres of beverage consumed during ad lib alcohol use periods (i.e. when alcohol is made available to participants in the lab).

Secondary outcomes

Secondary (proximal) outcomes. Divided into (a) alcohol-related proximal outcomes (alcohol cognitions); and (b) alcohol marketing-related proximal outcomes (marketing receptivity) (Figure 1 and Figure 2), both of which can be divided into two categories (Stautz 2016).

- Implicit cognitions and receptivity: automatically activated attitudes and beliefs coming to mind spontaneously upon exposure to alcohol or alcohol marketing.
- Explicit cognitions: conscious, reflective attitudes and beliefs relating to alcohol or alcohol marketing.

(a) Alcohol cognitions

- Observational learning (Bandura 1986), which can lead to the formation of a drinker prototype (individuals' images of a typical drinker).
- Expectancies, or the subjective anticipations of alcohol's effects and their likelihood (Neighbors 2007).
- Drinker identity (DiBello 2018; Lindgren 2015).
- Susceptibility to the influence of alcohol advertisements and intentions to drink.

(b) Marketing receptivity[a]

- Identification of a favourite brand to drink and brand allegiance.
- Marketing-related awareness, defined as attitudinal responsiveness, remembering, or liking a brand (McClure 2013).

- Marketing-related response, defined as aspirational messaging, consumer-generated marketing (McClure 2013).

[a]Marketing receptivity is conceptualised in its original form in Figure 2 (McClure 2013). In our conceptual model (Figure 1), we modify the elements of marketing receptivity, resulting in a slightly altered list of terms.

Search methods for identification of studies

Electronic searches

We will search the following databases.

- Cochrane Central Register of Controlled Trials (CENTRAL) (1992 to present)
- MEDLINE via Ovid (1946 to present);
- Embase via Elsevier (1947 to present);
- Web of Science and CINAHL (nursing / allied health) via EBSCO (1900 to present);
- PsycINFO via EBSCO (1806 to present);
- Communication & Mass Media Complete via EBSCO (1918 to present);
- Econlit via Proquest (1969 to present).

The search strategy for MEDLINE is presented in Appendix 2. We will modify the search strategy, subject headings and syntax for each database.

We will search for ongoing clinical trials and unpublished trials via searches of the following websites.

- ClinicalTrials.gov (www.ClinicalTrials.gov).
- World Health Organisation (WHO) International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictrp).

Searching other resources

To ensure we capture all relevant data, we will search for unpublished grey literature, including:

- dissertation data;
- data from white papers;
- government reports; and
- reports from organisations whose members study alcohol marketing.

We will search the following websites.

- OpenGrey.eu (OpenGrey.eu).
- Google Scholar (scholar.google.com.au).

We will search non-industry funded alcohol-related organisations, such as:

- Center on Alcohol Marketing and Youth (camy.org);
- European Centre for Monitoring Alcohol (eucam.info); and
- Institute of Alcohol Studies (www.ias.org.uk).

We will search government alcohol agencies, such as:

- Centers for Disease Control and Prevention (www.cdc.gov);
- National Institute on Alcohol Abuse and Alcoholism (www.niaaa.nih.gov);
- other institutes within National Institutes of Health (www.nih.gov); and
- the Dutch Institute for Alcohol Policy (www.stap.nl/en/home).

We will use search terms "alcohol" and "marketing" in the research sections of each of these websites and browse for relevant studies. We will also search for alcohol marketing-related presentations in relevant conference proceedings by identifying key alcohol conferences: American Public Health Association (apha.org); the Global Alcohol Policy Conference (www.gapc2017.org.au); and the Kettil Bruun Society conference (www.kettilbruun.org). We will examine conference proceedings from each conference website for the last five years (for feasibility). We will contact conference presenters who presented on relevant alcohol marketing topics but whose research does not appear in the published literature.

We will contact the authors of included studies for any unpublished data and/or any studies they or known others may be working on. In addition, we will handsearch the reference lists of included studies and relevant reviews.

We will not impose any language or date restrictions. We will translate potentially relevant studies written in languages other than English, French, and Italian.

Data collection and analysis

Selection of studies

Two review authors (SC and AW) will independently screen titles and abstracts. We will resolve any disagreements by discussion between the review authors or by referring to a third review author (JS or SM). We will acquire potentially relevant papers in full text and two review authors (SC and AW) will independently assess for inclusion. We will resolve disagreements about the study selection by discussion or by referring to a third review author (JS or SM). We will contact study authors to resolve any uncertainties.

Data extraction and management

Three review authors (SC, AW, BB) will independently extract data. We will use standardised data extraction forms and will pilot the forms on an initial set of five studies between the review authors who will be completing the data extraction. We will include the PROGRESS framework to identify the following sociodemographic characteristics (CPHG 2011), where applicable: place, race, occupation, gender, religion, education, socioeconomic status, social status. For each of the included studies, we will identify

which factors were reported at baseline and which were reported at the study endpoint. We will incorporate the relevant concepts from the Cochrane-Campbell Methods Group Equity checklist in designing our data extraction form to be sure we are attending to differences in alcohol marketing exposure and drinking outcomes among advantaged versus disadvantaged populations.
We will extract the following data.

- Methods, e.g. study design, length of follow-up, number of subjects included, number analysed.
- Participant characteristics, e.g. PROGRESS factors, age, drinking status, media exposure level and frequency.
- Interventions/exposure, e.g. type of alcohol marketing, frequency and amount of exposure; whether or not exposure is randomised by experimenter or self-selected by participants.
- Outcomes, e.g. all primary and secondary outcomes reported with timings (we anticipate drinking outcomes will be reported at multiple points in time), measurement units.
- Results, e.g. summary data for each exposure group, missing participants.
- Funding of the study and conflict of interest of study authors.

We will include potential confounders of drinking outcomes in the data extraction form, for example, parent drinking, peer drinking, sensation seeking, rebelliousness, parental monitoring, age, gender, and race/ethnicity, and will record whether results account for these confounding variables.
We will examine cases where we find multiple publications from the same study. We will ensure that included studies report on unique findings.
We will use Review Manager 5 to manage data storage and to complete the data analysis (Review Manager 2014).

Assessment of risk of bias in included studies

Two independent review authors (SC and AW) will assess risk of bias. We will use the EPOC 'Risk of bias' tool for randomised and non-randomised studies (see Appendix 3 for EPOC 'Risk of bias' criteria). For each domain, we will judge the risk of bias as low, high, or unclear if there is insufficient information to assess risk of bias. We will specify a summary risk of bias judgement for each specified outcome based on the 'Risk of bias' criteria most relevant to the review, in order to assess the strength of the association between the exposures and outcomes in the included studies. We will judge a summary risk of bias as 'low' if we judge all criteria under the relevant 'Risk of bias' domain as low. We will complete and present 'Risk of bias' tables, including justifications for each judgement.
The two review authors (SC and AW) will discuss any disagreements in data extraction; if they cannot reach consensus, a third review author (SM) will resolve the disagreement.

Measures of treatment effect

We anticipate heterogeneity in the reported measures of exposure to alcohol marketing as well as measures of primary and secondary outcomes. However, we will attempt to conduct a meta-analysis using data from the included studies grouped by type of exposure and category of outcome, where it is appropriate to do so.
In studies with dichotomous outcomes (e.g. drink initiation versus no drink initiation, having a favourite alcohol brand versus no favourite brand) or categorical outcomes (e.g. Likert scale results), we will summarise trial outcomes as risk ratios (RRs) with 95% confidence intervals (CIs). For continuous data, we will calculate the mean difference (MD) from baseline to each follow-up point in the intervention and control groups. If there are different measures of the same outcomes, we will calculate the standardised mean difference (SMD). For final reporting, we will attempt to back translate the various effect size estimates to clinically meaningful scales.

Unit of analysis issues

We are focusing on studies where the unit of analysis is the individual youth. We will include multilevel studies (e.g. youth nested within schools) if we are able to abstract an effect size and standard error at the individual youth level. We will also include higher level effects (e.g. school, community, city, etc.) that bear on the issue of alcohol marketing effects. We will either apply a best guess estimate correction, contact the study authors to obtain the original data or not include the study if the appropriate multilevel analysis has not been conducted and the appropriate standard errors are not published.

Dealing with missing data

We will contact the authors of the included studies if key study characteristics, including outcome data, are missing (e.g. when only a study abstract is available). We will not exclude studies based on the amount of missing outcome data. We will exclude studies that report 20% or more missing data, however, in a sensitivity analysis, we will determine if these studies are significantly different from the main body of studies and if they substantially influence the final estimates.

Assessment of heterogeneity

Heterogeneity can be either clinical or methodological. We will assess clinical heterogeneity based on the variability in the participants, exposures and outcomes in the included studies and we will base decisions on heterogeneity on consensus. We will not combine clinically heterogeneous studies for the meta-analysis.
We will assess methodological heterogeneity based on variability in study designs and will base assessments of risk of bias decisions on consensus. We will handle methodological heterogeneity in the same way as clinical heterogeneity.

We will analyse statistical heterogeneity by means of the I^2 statistic and the Chi^2 test. We will regard heterogeneity as substantial if I^2 is greater than 50% or the P value lower than 0.10 for the Chi^2 test for heterogeneity. Following the guidance in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), we will distinguish the following values to denote not important, moderate, substantial, and considerable heterogeneity, respectively: 0% to 40%, 30% to 60%, 50% to 90%, and 75% to 100%. If we find considerable levels of heterogeneity (i.e. $\geq$ 75%), we plan to explore possible reasons by visually inspecting the forest plot to identify studies that might be contributing to the heterogeneity.

Assessment of reporting biases

We will use funnel plots (plots of the effect estimate from each study against the sample size or effect standard error) to assess the potential for bias related to the size of the trials, which could indicate possible publication bias. A plot with greater scatter will designate lower levels of bias, indicating the inclusion of studies regardless of results. We will inspect funnel plot symmetry if there are at least 10 studies included in the meta-analysis.

Data synthesis

Theoretical and clinical backing supports the use of a random-effects model for the meta-analysis, because we expect a certain degree of heterogeneity among studies. We will use the Mantel-Haenszel method to synthesise data in Review Manager 5 (Review Manager 2014). If clinical and methodological heterogeneity lead to high levels of statistical heterogeneity, we will attempt to compute Cohen's d, standardised MDs to reduce aspects of heterogeneity. Realistically, however, a high level of clinical and methodological heterogeneity may result in no possibility of analysis. If quantitative synthesis will not be appropriate, we will provide a systematic narrative synthesis of all included studies, organised by exposure type (paid, earned, owned media) and outcomes measured, by publication date. We will use the Economic and Social Research Council Guidance on the Conduct of Narrative Synthesis in Systematic Reviews to inform our review (Popay 2006).
We anticipate organising study results based on type of marketing exposure (paid, earned, owned media, as per our definition herein) and then within each exposure type, we will present results by primary and secondary outcomes. We will analyse and synthesise randomised experiments separately from non-randomised studies. We will pool data across different observational study designs and assess the potential association between study design and effect size, stratifying by study design. Should we find that a non-statistical synthesis is most appropriate, we will explore graphical means of synthesising the findings.

'Summary of findings' tables

Two review authors (BB and KJ) will assess the quality of evidence for all outcomes using the GRADE system for assessing the quality of evidence (Atkins 2004; Guyatt 2008; Guyatt 2011; Schunemann 2006). GRADE takes into account issues not only related to internal validity but also to external validity, such as directness of results. The 'Summary of findings' tables present the main findings of the review in a transparent and simple tabular format. In particular, they provide key information concerning the quality of evidence, the magnitude of effect of the interventions examined and the sum of available data on the main outcomes. We will present three 'Summary of findings' tables, one for each of the three types of media exposures (paid, earned and owned media) and each will include primary outcomes (see Table 3 for draft 'Summary of findings' table for paid media).
The GRADE system uses the following criteria for assigning grades of evidence.

- High: we are very confident that the true effect lies close to that of the estimate of the effect.
- Moderate: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
- Low: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
- Very low: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

Grading is decreased for the following reasons.

- Serious (−1) or very serious (−2) study limitation for risk of bias.
- Serious (−1) or very serious (−2) inconsistency between study results.
- Some (−1) or major (−2) uncertainty about directness (the correspondence between the population, the intervention, or the outcomes measured in the studies actually found and those under consideration in our systematic review).
- Serious (−1) or very serious (−2) imprecision of the pooled estimate (−1).
- Publication bias strongly suspected (−1).

Grading is increased for observational studies for the following reasons.

- Strong evidence of association - significant risk ratio of more than 2.0 (or less than 0.5), based on consistent evidence from two or more observational studies, with no plausible confounders (+1).
- Very strong evidence of association - significant risk ratio of more than 5.0 (or less than 0.2), based on direct evidence with no major threats to validity (+2).
- Evidence of a dose response gradient (+1).
- All plausible confounders would have reduced the effect (+1).

We will rate non-randomised studies as low quality at the starting point and then further downgrade or upgrade them. We will use GRADEpro GDT (Schünemann 2013) to develop the 'Summary of findings' tables.

Subgroup analysis and investigation of heterogeneity

We will perform a subgroup analysis investigating heterogeneity using the following subgroups (see Table 4).

- Participants: age, gender, country (low- and middle-income countries versus high-income countries).
- Exposure type: paid media, earned media, owned media.
- Study type: funding source (alcohol industry versus non-alcohol industry), published versus unpublished studies.

Sensitivity analysis

We will perform sensitivity analyses to assess the impact of excluding studies with higher risk of bias (including studies with more than 20% of dropouts or inadequate confounding control, i.e. controlling for age, gender, race/ethnicity (if relevant), parenting style (monitoring or responsiveness, or both), parent drinking, and sensation seeking (or rebelliousness or externalising)), and time of publication.

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* *Indicates the major publication for the study*

ADDITIONAL TABLES

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017)

				Study design		Systematic review author and publication date			
Study title	**Authors**	**Publication date**	**Sample size**	**Longitudinal**	**Cross-sectional**	**Smith 2009**	**Anderson 2009**	**Scott 2016**	**Jernigan 2017**
Does alcohol advertising promote adolescent drinking? Results from a longitudinal assessment	Ellickson, Collins, Hambarsooians	2005	3111	X		X	X	X	
Exposure to televised alcohol ads and subsequent adolescent alcohol use	Stacy, Zogg, Unger	2004	2250	X		X	X	X	
Trajectories of drinking from 18 to 26 years: identification and prediction	Casswell, Pledger, Pratap	2002	714	X		X	X		
Impact of liking for advertising and brand allegiance on drinking and alcohol-related aggression: a longitudinal study	Casswell, Zhang	1998	630	X		X	X		

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

Alcohol in the mass media and drinking by adolescents: a longitudinal study	Connolly, Caswell, Zhang	1994	667	X		X	X		
Report on the impact of European alcohol marketing exposure on youth alcohol expectancies and youth drinking	de Bruijn, Tanghe, Beccaria, Bujalski, Celata, Gosselt	2012	6651	X				X	X
Predictors of initiation alcohol use among US adolescents: findings from a prospective cohort study	Fisher, Miles, Austin	2007	5511	X			X	X	
The impact of alcohol marketing on youth drinking behavior: a two-stage cohort study	Gordon, MacKintosh, Moodie	2010	552	X				X	X
Exposure to alcohol advertise-	Grenard, Dent, Stacy	2013	3890	X				X	X

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

ments and teenage alcohol-related problems									
Receptivity to alcohol marketing predicts initiation of alcohol use	Henriksen, Feighery, Schleicher	2008	1080	X	X		X	X	
Alcohol-branded merchandise and its association with drinking attitudes and outcomes in US adolescents	McClure, Stoolmiller, Tanski	2009	5503	X			X	X	
Favourite alcohol advertisements and binge drinking among adolescents: a cross-cultural cohort study	Morgenstern, Sargent, Sweeting, Faggiano, Mathis, Hanewinkel	2014	7438	X				X	X
Television and music video exposure and risk of adolescent alcohol use	Robinson, Chen, Killen	1998	2609	X		X	X		

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

Alcohol use in motion pictures and its relation with early-onset teen drinking	Sargent, Willis	2006	3577	X	X	X	X		
Effects of alcohol advertising exposure on drinking among youth	Snyder, Fleming-Milici, Slater, Sun, Strizhakova	2006	1872	X		X	X		
Television and music video exposure and adolescent alcohol use while going out	Van Den Bulck, Beullens	2005	2546	X		X	X		
Using media exposure to predict the initiation and persistence of youth alcohol use in Taiwan	Chang, Lee, Chen, Chiu, Miao, Pan	2014	2315	X					X
The association between alcohol outlet density and alcohol use among urban and regional Australian adoles-	Azar, White, Coomber	2016	68208		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

cents									
Adolescent alcohol use reflects community-level alcohol consumption irrespective of parental drinking	Bendtsen, Damsgaard, Tolstrup	2013	2911		X			X	
Community alcohol outlet density and underage drinking	Chen, Grube, Gruenewald	2010	1091	X				X	
Early adolescent exposure to alcohol advertising and its relationship to underage drinking	Collins, Ellickson, McCaffrey	2007	1786	X	X			X	
Exposure to online alcohol marketing and adolescents' drinking: a cross-sectional study in four European countries	de Bruijn, Engels, Anderson	2016	9038		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

European longitudinal study on the relationship between adolescents' alcohol marketing exposure and alcohol use	de Bruiijn, Taghe, de Leeuw	2016	9075		X			X	
Changes in self-reported drinking behaviours among U. S. teenagers associated with the introduction of flavored malt beverages: an interrupted time series quasi-experiment	Dumsha	2011	50303	X				X	
Association between alcohol advertising and beer drinking among adolescents	Faria, Vendrame, Silva	2011	1115		X			X	
Critical social marketing: Assessing the cumu-	Gordon	2011	920		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

lative impact of alcohol marketing on youth drinking									
Assessing the cumulative impact of alcohol marketing on young people's drinking: cross-sectional data findings	Gordon, Harris, MacKintosh	2010	920		X			X	
Exposure to alcohol advertising on television and alcohol use among young adolescents	Grenard	2008	3890	X				X	
Longitudinal study of exposure to entertainment media and alcohol use among German adolescents	Hanewinkel, Sargent	2009	2708		X		X		
Consumer socialization and the role of branding in haz-	Harris, Gordon, MacKintosh, Hastings	2015	552	X					X

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

ardous adolescent drinking									
Exposure to alcohol advertisements and alcohol consumption among Australian adolescents	Jones, Magee	2011	1113		X			X	
Alcohol outlet density, perceived availability and adolescent alcohol use: a multilevel structural equation model	Kuntsche, Kuendig, Gmel	2008	6183		X			X	
Engagement with alcohol marketing and early brand allegiance in relation to early years of drinking	Lin, Caswell, You	2012	2538		X			X	
A spatial analysis of student binge-drinking, alcohol outlet density,	Lo, Weber, Cheng	2013	78138		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

and social disadvantages									
Urban rural differentials: a spatial analysis of Alabama students' recent alcohol use and marijuana use	Lo, Weber, Cheng	2013	92822		X			X	
Internet alcohol marketing and underage alcohol use	McClure, Tanski, Li, Jackson, Morgenstern, Li	2016	2012	X					X
Ownership of alcohol-branded merchandise and initiation of teen drinking	McClure, Dal Cin, Gibson	2006	2406	X				X	
Alcohol marketing receptivity, marketing-specific cognitions and underage binge drinking	McClure, Stoolmiller, Tanski	2013	1734		X			X	
Attituds as mediators of the longitu-	Morgenstern, Isensee, Sargent,	2011	2130	X					X

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

dinal association between alcohol advertising and youth drinking	Hanewinkel								
Alcohol outlets and youth alcohol use: exposure in suburban areas	Pasch, Hearst, Nelson	2009	242		X			X	
Outdoor alcohol advertising near schools: what does it advertise and how is it related to intentions and use of alcohol among young adolescents?	Pasch, Komro, Perry	2007	4137	X			X		
Is commercial alcohol availability related to adolescent alcohol sources and alcohol use? Findings from a multi-level study	Paschall, Grube, Black	2007	3332		X			X	
Social and famil-	Ross	2014	3576	X					X

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

ial risk factors for alcohol initiation and affective response to marijuana use									
Associations between alcohol outlet densities and adolescent alcohol consumption: a study in Australian students	Rowland	2014	10143		X			X	
A behavioral economic model of alcohol advertising and price	Saffer, Dave, Grossman	2015	8984	X					X
Alcohol advertising and alcohol consumption by adolescents	Saffer, Dave	2006	73000		X			X	
Outlet density as a predictor of alcohol use in early adolescence	Shamblen, Harris, Ringwalt	2011	5903	X				X	
Physical, social, and perceived	Stanley, Henry, Swaim	2011	151703		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

availabilities of alcohol and last month alcohol use in rural and small urban communities									
Comparing media and family predictors of alcohol use: a cohort study of US adolescents	Stoolmiller, Wills, McClure	2012						X	
Alcohol marketing and drunkenness among students in the Philippines: findings from the nationally representative Global School-based Student Health Survey	Swahm, Palmier, Benegas-Segarra	2013	2257		X			X	
Parental R-rated movie restriction and early-onset alcohol use	Tanski, Dal Cin, Stoolmiller, Sargent	2010	1596	X					X

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

Relationship between neighbourhood context, family management practices, and alcohol use among urban, multiethnic, young adolescents	Tobler, Komro, Maldonado-Mollina	2009	5655	X				X	
Neighbourhood context and alcohol use among urban, low-income, multi ethnic, young adolescents	Tobler	2009	5655	X				X	
Racial/ethnic differences in the etiology of alcohol use among urban adolescents	Tobler, Livingston, Komro	2011	4027	X				X	
Essays on environmental determinants of health behaviors and outcomes	Truong	2008	3660		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

Alcohol environments and disparities in exposure associated with adolescent drinking in California	Truong, Sturm	2009	3660		X			X	
Happy hours and other alcohol discounts in cafes: prevalence and effects on underage adolescents	van Hoof, van Noordenburg, de Jong	2008	172		X			X	
Movie exposure to alcohol cues and adolescent alcohol problems: a longitudinal analysis in a national sample	Wills, Sargent, Gibbons	2009	6522	X			X		
Alcohol promotional clothing items and alcohol use by underage consumers	Workman	2003	262		X			X	

Table 1. Studies of the influence of alcohol marketing exposure on drinking outcomes included in systematic reviews (2009 to 2017) (*Continued*)

Associations between proximity and density of local alcohol outlets and alcohol use among Scottish adolescents	Young, Macdonald, Ellaway	2013	868		X			X	
Adolescent exposure to alcohol advertising: a prospective extension of Strickland's model (dissertation)	Zogg	2004	1097	X				X	
Density of alcohol outlets and teenage drinking: living in an alcogenic environment is associated with higher consumption in a metropolitan setting	Huckle, Huakau, Sweetsur	2008	1179		X				

Table 2. Key findings from meta-analyses of experimental studies of alcohol marketing exposure and drinking outcomes (Stautz 2016)

Exposure	Outcome	No. studies	No. participants	Result
Alcohol advertising	Immediate drinking	7	758[a]	Small positive effect (SMD 0.20, 95% CI 0.05 to 0.34)
Portrayals of alcohol use	Immediate drinking	6	605[a]	No difference (SMD 0.16, 95% CI -0.05 to 0.37)
Alcohol advertising	Explicit alcohol-related cognitions (attitudes, outcome expectancies, intentions to consume)	7	1368[a]	No difference (SMD 0.09, 95% CI -0.04 to 0.22)
Alcohol advertising	Implicit attitudes towards alcohol (automatically activated attitudes coming to mind spontaneously upon exposure to the attitude object)	3	451[a]	No difference (SMD 0.15, 95% CI -0.04, 0.33)
Portrayals of alcohol use	Explicit alcohol-related cognitions	3	281	Positive effect (SMD = 0.40, 95% CI 0.07, 0.73)

CI: confidence interval
SMD: standardised mean difference
[a] sample size for this meta-analysis was smaller than the optimal information size, reducing the quality of evidence.

Table 3. Summary of findings table: paid media

Influence of alcohol marketing on youth drinking						
Population: youth up to age 25 Setting: community Exposure (intervention): paid media Comparison: no exposure or less exposure						
Outcomes	**Comparative risk**		**Relative effect (95% CI)**	**Number of participants**	**Quality of the evidence (GRADE)**	**Comments**
	Risk with no exposure	**Risk with exposure**				
Sipping/tasting/trying drinking						

Table 3. Summary of findings table: paid media (*Continued*)

Current drinking					
Binge drinking					
Hazardous drinking					
Drinking frequency					
Immediate drinking					

Table 4. Subgroup analysis and investigation of heterogeneity

Participants			**Exposure type**			**Study type**	
Age (< 18 versus 18+ yrs)	Gender	Country (LM versus H)	Paid media	Earned media	Owned media	Funding source (alcohol industry versus non-industry)	Published versus unpublished studies

H: high-income country; LM: low- and middle-income country

APPENDICES

Appendix 1. Glossary of study designs

Glossary of study designs (Higgins 2011).

Non-randomised controlled trial: an experimental study in which people are allocated to different interventions using methods that are not random.

Controlled before-and-after study: a study in which observations are made before and after the implementation of an intervention, both in a group that receives the intervention and in a control group that does not.

Interrupted time series study: a study that uses observations at multiple time points before and after an intervention (the 'interruption'). The design attempts to detect whether the intervention has had an effect significantly greater than any underlying trend over time.

Historically controlled study: a study that compares a group of participants receiving an intervention with a similar group from the past who did not.

Cohort study: a study in which a defined group of people (the cohort) is followed over time, to examine associations between different interventions received and subsequent outcomes. A 'prospective' cohort study recruits participants before any intervention and follows them into the future. A 'retrospective' cohort study identifies subjects from past records describing the interventions received and follows them from the time of those records.

Case-control study: a study that compares people with a specific outcome of interest ('cases') with people from the same source population but without that outcome ('controls'), to examine the association between the outcome and prior exposure (e.g. having an intervention). This design is particularly useful when the outcome is rare.
Cross-sectional study: a study that collects information on interventions (past or present) and current health outcomes, i.e. restricted to health states, for a group of people at a particular point in time, to examine associations between the outcomes and exposure to interventions.

Appendix 2. MEDLINE search strategy

Concept: Alcohol
(alcohol or alcoholic or beer or wine or liquor or spirits or binge drink* or aod or social drink* or underage drink* or under-age drink* or adolescent drink* or youth drink* or (adolescent adj3 drinking) or (youth adj3 drinking) or (risk* adj3 drinking) or (young adj3 drink*) or (college adj3 drink*) or (school age adj3 drink*))
Concept: Marketing
(Marketing or Advertis* or ads or Media or Brand* or sponsor* or promotion* or merchandis* or placement* or billboard* or Movie* or Motion picture* or cinema or Music or song* or magazine* or newspaper* or radio or TV or Television or Text messag* or Internet or Mobile or Apps or App or Smart phone* or smartphone* or website* or web site* or web page* or webpage* or Snapchat or Twitter or Tweet* or social networking site* or blog* or Facebook or Tumblr or Instagram or YouTube or Pinterest or video game* or online game* or gaming).mp.
Database(s): **Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R)** 1946 to Present

#	Searches	Results
1	exp Alcohol-Related Disorders/ or exp Alcohol Drinking/ or exp Alcoholic Beverages/	160264
2	exp Mass Media/ or exp Marketing/ or exp Internet/ or exp Smartphone/ or exp Mobile Applications/	134765
3	1 and 2	1906
4	((alcohol or alcoholic or beer or wine or liquor or spirits or binge drink* or aod or social drink* or underage drink* or under-age drink* or adolescent drink* or youth drink* or (adolescent adj3 drinking) or (youth adj3 drinking) or (risk* adj3 drinking) or (young adj3 drink*) or (college adj3 drink*) or (school age adj3 drink*)) adj7 (Marketing or Advertis* or ads or Media or Brand* or sponsor* or promotion* or merchandis* or product placement* or billboard* or Movie* or Motion picture* or cinema or Music or song* or magazine* or newspaper* or radio or TV or Television or Text messag* or Internet or Mobile or Apps or App or Smart phone* or smartphone* or website* or web site* or web page* or webpage* or Snapchat or Twitter or Tweet* or social networking site* or blog* or Facebook or Tumblr or Instagram or YouTube or Pinterest or video game* or online game* or gaming)).mp	3186
5	3 or 4	4166

(*Continued*)

6	remove duplicates from 5	4079

Databases Searched on February 15, 2017

Appendix 3. EPOC 'Risk of bias' criteria

EPOC 'Risk of bias' criteria (EPOC 2017**).**

Risk of bias for studies with a separate control group

Was the allocation sequence adequately generated?

Score 'low risk' if a random component in the sequence generation process is described (e.g. referring to a random number table). Score 'high risk' when a non-random method is used (e.g. performed by date of admission). Non-randomised trials and controlled before-and-after studies should be scored 'high risk'. Score 'unclear risk' if not specified in the paper.

Was the allocation adequately concealed?

Score 'low risk' if the unit of allocation was by institution, team or professional and allocation was performed on all units at the start of the study; or if the unit of allocation was by patient or episode of care and there was some form of centralised randomisation scheme, an on-site computer system or sealed opaque envelopes were used. Controlled before-and-after studies should be scored 'high risk'. Score 'unclear risk' if not specified in the paper.

Were baseline outcome measurements similar?

Score 'low risk' if performance or patient outcomes were measured prior to the intervention, and no important differences were present across study groups. In randomised trials, score 'low risk' if imbalanced but appropriate adjusted analysis was performed (e.g. analysis of covariance). Score 'high risk' if important differences were present and not adjusted for in analysis. If randomised trials have no baseline measure of outcome, score 'unclear risk'.

Were baseline characteristics similar?

Score 'low risk' if baseline characteristics of the study and control providers are reported and similar. Score 'unclear risk' if it is not clear in the paper (e.g. characteristics are mentioned in text but no data were presented). Score 'high risk' if there is no report of characteristics in text or tables or if there are differences between control and intervention providers. Note that in some cases imbalance in patient characteristics may be due to recruitment bias whereby the provider was responsible for recruiting patients into the trial.

Were incomplete outcome data adequately addressed?

Score 'low risk' if missing outcome measures were unlikely to bias the results (e.g. the proportion of missing data was similar in the intervention and control groups or the proportion of missing data was less than the effect size, i.e. unlikely to overturn the study result). Score 'high risk' if missing outcome data was likely to bias the results. Score 'unclear risk' if not specified in the paper (do not assume 100% follow-up unless stated explicitly).

Was knowledge of the allocated interventions adequately prevented during the study?

Score 'low risk' if the authors state explicitly that the primary outcome variables were assessed blindly, or the outcomes are objective, e.g. length of hospital stay. Primary outcomes are those variables that correspond to the primary hypothesis or question as defined by the authors. Score 'high risk' if the outcomes were not assessed blindly. Score 'unclear risk' if not specified in the paper.

Was the study adequately protected against contamination?

Score 'low risk' if allocation was by community, institution or practice and it is unlikely that the control group received the intervention. Score 'high risk' if it is likely that the control group received the intervention (e.g. if patients rather than professionals were randomised). Score 'unclear risk' if professionals were allocated within a clinic or practice and it is possible that communication between intervention and control professionals could have occurred (e.g. physicians within practices were allocated to intervention or control).

Was the study free from selective outcome reporting?

Score 'low risk' if there is no evidence that outcomes were selectively reported (e.g. all relevant outcomes in the methods section are reported in the results section). Score 'high risk' if some important outcomes are subsequently omitted from the results. Score 'unclear risk' if not specified in the paper.

Was the study free from other risks of bias?

Score 'low risk' if there is no evidence of other risk of biases.

Risk of bias for interrupted time series studies

Was the intervention independent of other changes?

Score 'low risk' if there are compelling arguments that the intervention occurred independently of other changes over time and the outcome was not influenced by other confounding variables/historic events during study period. If events/variables identified, note what they are. Score 'high risk' if reported that intervention was not independent of other changes in time.

Was the shape of the intervention effect prespecified?

Score 'low risk' if point of analysis is the point of intervention OR a rational explanation for the shape of intervention effect was given by the author(s). Where appropriate, this should include an explanation if the point of analysis is NOT the point of intervention. Score 'high risk' if it is clear that the condition above is not met.

Was the intervention unlikely to affect data collection?

Score 'low risk' if reported that intervention itself was unlikely to affect data collection (e.g. sources and methods of data collection were the same before and after the intervention); score 'high risk' if the intervention itself was likely to affect data collection (e.g. any change in source or method of data collection reported).

Was knowledge of the allocated interventions adequately prevented during the study?

Score 'low risk' if the authors state explicitly that the primary outcome variables were assessed blindly, or the outcomes are objective, e.g. length of hospital stay. Primary outcomes are those variables that correspond to the primary hypothesis or question as defined by the authors. Score 'high risk' if the outcomes were not assessed blindly. Score 'unclear risk' if not specified in the paper.

Were incomplete outcome data adequately addressed?

Score 'low risk' if missing outcome measures were unlikely to bias the results (e.g. the proportion of missing data was similar in the pre- and post-intervention periods or the proportion of missing data was less than the effect size, i.e. unlikely to overturn the study result). Score 'high risk' if missing outcome data was likely to bias the results. Score 'unclear risk' if not specified in the paper (do not assume 100% follow-up unless stated explicitly).

Was the study free from selective outcome reporting?

Score 'low risk' if there is no evidence that outcomes were selectively reported (e.g. all relevant outcomes in the methods section are reported in the results section). Score 'high risk' if some important outcomes are subsequently omitted from the results. Score 'unclear risk' if not specified in the paper.

Was the study free from other risks of bias?

Score 'low risk' if there is no evidence of other risk of biases. For example, should consider if seasonality is an issue (i.e. if January to June comprises the pre-intervention period and July to December the post, could the 'seasons' have caused a spurious effect)?

CONTRIBUTIONS OF AUTHORS

Draft the protocol: SC, AW, KJ, SM, BB, MS, JS

Study selection: SC, AW, KJ, BB

Extract data from studies: SC, AW, KJ, BB

Enter data into Review Manager 5: SC, AW, BB, MS

Carry-out the analysis: MS, SM

Interpret the analysis: SC, AW, KJ, BB, MS, SM

Draft the final review: SC, AW, KJ, SM, BB, MS, JS

Disagreement resolution: SM, JS

Update the review: SC, AW

DECLARATIONS OF INTEREST

Samantha Cukier declares no financial or other conflicts of interest.

Ashley Wettlaufer declares no financial or other conflicts of interest.

Kristie Jackson declares no financial or other conflicts of interest.

Silvia Minozzi declares no financial or other conflicts of interest.

Bruce Bartholow declares that he has served as PI on grants relevant to the topic of this review and has received payment for time spent preparing the review. However, these activities did not influence the content of the review and he does not consider them to be conflicting interests.

Michael Stoolmiller declares no financial or other conflicts of interest.

James Sargent declares no financial or other conflicts of interest.

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